

### Introduction

Thank you for your purchase. This quick start guide contains a minimal set of information to enable you to get up and running with your new accessory. This is not intended as a replacement for the User's Manual, and we strongly encourage you to use this to get a sense of the steps required to setup your system – which is much more than just the rotary hardware – as you 'open the box' – and then review the User's Manual in detail.

### Safety

The CNC Shark, along with a router or other power tool, is a computer-numerically-controlled (CNC) routing system. As such, it is a powerful system that can reduce your woodworking risks by providing a method of cutting wood and other materials without having to interact with the cutting tool(s) or material during the fabrication process. As with all power tools, your care and attention are required to ensure that you use your CNC Shark safely. Next Wave Automation assumes you will use your CNC Shark safely and follow accepted safety precautions and practices for woodworking and machining.

You should read and practice the safety recommendations found in the CNC Shark 4<sup>th</sup> Axis Table Top Accessory User's Manual.

### 4<sup>th</sup> Axis Overview

The CNC Shark 4<sup>th</sup> Axis give you the ability to create precision turned spindles or columns that include intricate carvings and designs that will astonish your clients. The CNC Shark 4<sup>th</sup> Axis easily bolts to your existing Shark bed. It comes complete with a Nova Precision Midi 4 jaw Chuck and features a standard 1" x 8 TPI drive shaft to allow you to use just about any of your lathe accessories.

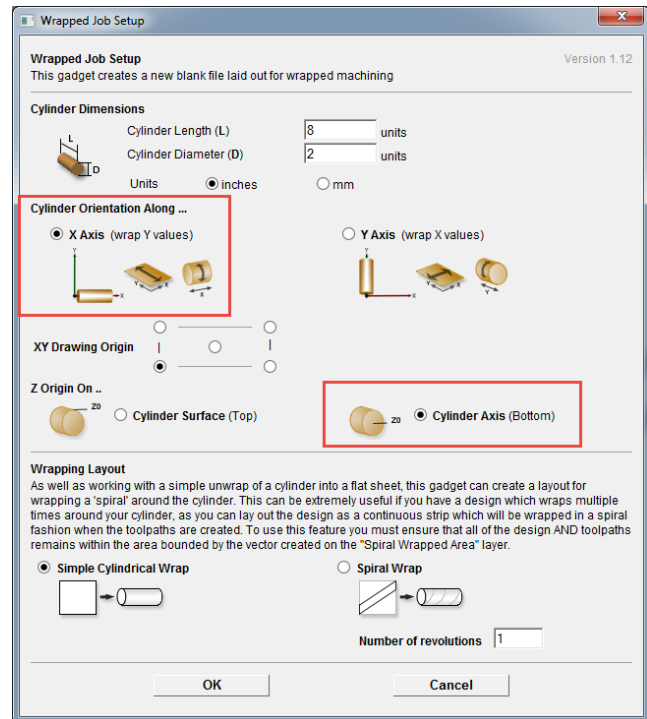
### Create the Design and Toolpaths

VCarve Pro is used to create the design of the part you want. However, there is a **distinctly different workflow** when creating a rotary project. You are strongly encouraged to review the training material found on the Vectric support site. The most recent rotary machining tutorial can be found at the [Vectric support site](#).

When creating a new rotary project for use with the CNC Shark, in the Wrapped Job Setup you must select:

- Cylinder Orientation Along X Axis
- Z Origin on Cylinder Axis (Bottom)

You can choose either 'Wrapping Layouts'.



### Rotary Post Processors

You must also use the appropriate post processor when saving the toolpath file. There are currently 4 post processors associated with the 4<sup>th</sup> axis. These are available for download from the [NWA web site](#). Use the 'Orient X' post processor if your 4<sup>th</sup> axis hardware is setup along your machine's X axis, or within 45° of the X axis. Use the 'Orient Y' post processor if your 4<sup>th</sup> axis hardware is setup along your machine's Y axis, or within 45° of the Y axis. After downloading these, install them into your VCarve Pro setup.

### Setup Steps – Before You Mount the Rotary

When you first receive the CNC Shark 4<sup>th</sup> Axis Table Top accessory, there are a few steps you'll need to take before you 'set it up' and run a project.

- Installing the A Axis Controller Module in the Shark Control Box – you will want to review these steps in the User's Manual
- Mounting the Nova chuck on the 4<sup>th</sup> axis motor assembly
- Install the Shark Control Panel 2.x and register
- Install the CNC Shark rotary post processors into your VCarve Pro configuration
- Check gantry height – ensure the gantry is positioned 'high enough' to clear the motor/chuck assembly on your table.

## 4<sup>th</sup> Axis Physical Setup

You must position the motor/chuck and tailstock assembly within the safe travel limits of your machine. One way to ensure this is to jog the gantry to each edge of the table surface and place a piece of tape to mark the limit. You can place the axis of the rotary accessory along the X axis, the Y axis, or angled. It is best to have the material you are going to use so that you can position the tail stock at an appropriate distance from the motor/chuck the 'first time'. A more detailed discussion of the physical setup options you can use, along with the associated SCP 2.x settings can be found in the 4<sup>th</sup> Axis Layout, SCP2 Preferences and Post Processors appendix of the User's Manual.

Position the gantry out of the way of the setup area. Place the motor/chuck assembly on the table, and use the hardware to secure this to the table. You may find that you are using a bolt on one side, and a clamp for the other side. Be sure to attach the grounding cable to a grounding point on the machine. You will find these at each of the axis motor mounting points. Extend the grounding cable as necessary to ensure that the motor/chuck assembly is properly grounded.

With the SCB powered off, connect the 4<sup>th</sup> axis cable to the A-axis output on the back of the SCB.

Once the motor/chuck assembly is in place, secure the material in the chuck – snug, not tight – and position the tailstock. Ensure there is enough travel distance for the tailstock to be tightened against the material end before attaching the tailstock to the table.

Once you have established the general location of the tailstock, remove the material. You will find that rotating (jogging) the chuck to a position where a small square can be lightly held by the chuck so that the base of the square is flat on a table, and using a framing square set against the chuck side of the motor/chuck assembly will make positioning the tailstock easier and result in the 'best' position of the tailstock in relation to the motor/chuck assembly. You may find that you are using a bolt on one side of the tailstock, and a clamp for the other side.

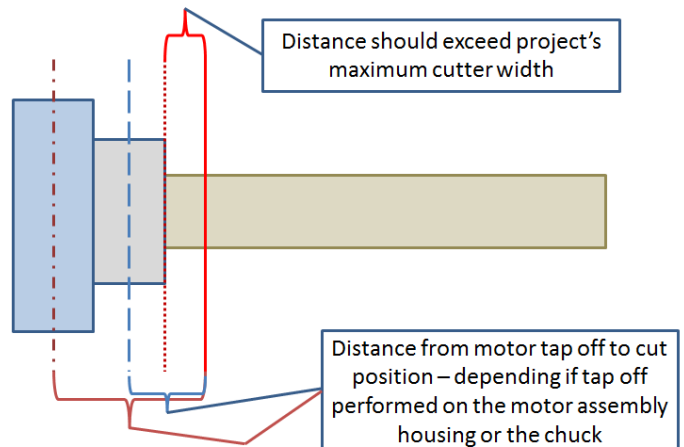
Mount the material in the chuck, snug the chuck on the material. Then position the tailstock to the material, and snug the tailstock to the material. Tighten the chuck and then tighten the tailstock to the material. Rotate (jog) the axis to ensure the material moves with no binding of the rotary axis, and that the material is not 'wobbling'. If wobbling occurs, reposition the tailstock as necessary and repeat these steps. This process is no different than positioning material in a lathe. The exception is that the chuck and tailstock are not permanently mounted on a chassis. In addition to ensuring you've positioned the material properly with regard to the chuck and the tailstock, you must confirm that the tailstock is positioned properly with respect to the motor/chuck assembly.

## SCP2 A|4<sup>th</sup> Axis Preferences

With the SCP2 running, open the Preferences panel, and select the 'A|4<sup>th</sup> Axis' tab. The A|4<sup>th</sup> Axis tab has several parameters that control the behavior of the SCP2 4<sup>th</sup> Axis.

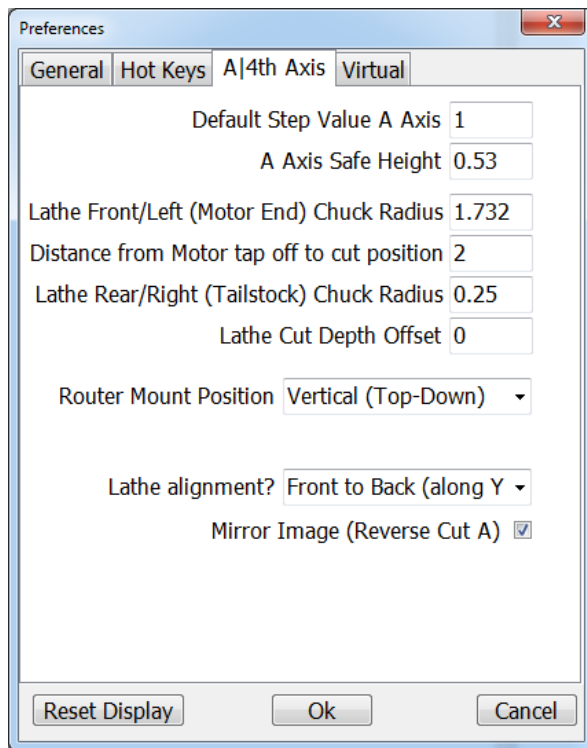
- Default Step Value A Axis – set the default value for jogging the A Axis when in the Step mode.

- A Axis Safe Height - this sets the height above the front end tap off point at which the SCP2 will raise the tool prior to making any lateral moves when responding to SCP2 commands Detect Touch Plate and Move Offset.
- Lathe Front/Left (Motor End) Chuck Radius – this sets the radius of the lathe chuck along the circumference line that the tool is tapped off of. Be sure to enter the radius and not the diameter.
- Distance from Motor tap off to cut position – this is the distance from the location on the chuck that you use to touch off of to a safe position to cut into the material – without engaging any of the chuck components with the tool.



- Lathe Rear/Right (tailstock) Chuck Radius – this sets the radius of the lathe tailstock along the circumference line that the tool is touched off of. Be sure to enter the radius and not the diameter.
- Lathe Cut Depth Offset - you can set a value here that will result in a global change of depth in the calculated cut when using the 4<sup>th</sup> axis setup. For example, if with your particular system you are always finding the depth of cut is consistently 0.03 too deep (low), you can set a value of 0.03 in this preference and save it.
- Router Mount Position
  - Vertical (Top-Down) – the correct setting when using the Shark 4<sup>th</sup> Axis Table Top Kit.
  - Horizontal (Sideways) – future capability when support for using a mini-lathe as the 4<sup>th</sup> axis is fielded.
- Lathe alignment – choose one of two settings
  - Front to Back (along Y) if you have setup the Shark 4<sup>th</sup> Axis Table Top Kit oriented along the Y axis.
  - Left to Right (along X) if you have setup the Shark 4<sup>th</sup> Axis Table Top Kit oriented along the X axis.
- Mirror Image (Reverse Cut A) – you can check this flag if you find your carving coming out in a reverse image. There is no need to adjust the post processor in this case – just set or unset the flag as appropriate for use in your setup.

Be sure to hit 'OK' to save your changes. If you hit 'Cancel', no changes will be saved. It is a good idea to open the preferences panel after closing to ensure you have in fact committed (saved) the desired preference settings. **Note: Anytime you change any of the A|4<sup>th</sup> Axis preferences, you must perform the 'Set Front' and 'Set Rear' tasks.**

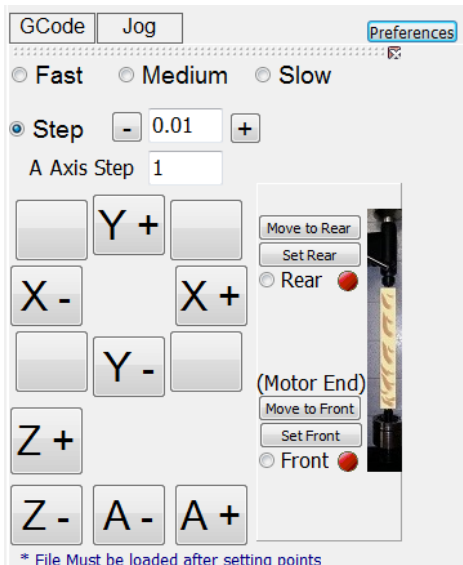


## Establishing Tool Location Relative to the Rotary

You use the A-axis jog panel and the commands within it to establish the tool location and resulting offset position. This is sometimes referred to as 'tapping off'. **Note: You must perform this step with every tool changes, and BEFORE you load the tapfile.**

When the AAxis is enabled, the Jog panel is configured to support the use with a rotary setup. You typically use the Jog Controls to move the gantry to:

- Position the tool at the head or tailstock to touch off and establish the zero point at each end of the rotary.
- Move the cutter tool to the offset.
- Move the gantry to a position on the table to enable material placement and chucking or removal from the rotary axis.



You will note that in addition to the ability to jog the XYZ axes, the A (rotary) axis jog is now available. The A Axis Step default value is defined in the Preferences, A|Axis tab.

To the right of the axes jog buttons is a layout of the rotary axis. Each end of the rotary has 2 buttons – 'Move to' and 'Set'. You must establish the zero at both the Motor (chuck) end of the rotary and the Rear (tailstock) end of the rotary. Once these are set, you will see a green gumball with a check mark, and when you tap the 'Move to' button, the gantry will move to that position. Until you 'Set' an end, there will be no response to a 'Move to' command.

Position the tool above the desired tap off point, at the centerline of the Motor (chuck) End of the rotary, along the circumference line of the motor assembly or chuck (this is the circumference line you are using as a reference for the 'Distance from Motor tap off to cut position' A|4<sup>th</sup> Axis preference setting). Tap on 'Set Front'. The Point Collector panel will appear on the screen. Once you have set one end, you can repeat the steps on the other end.

At this point (green gumballs with check marks), when you tap on 'Move to Offset', the gantry will position the tool at the A-axis safe height (unless the tool is higher than that already), and along the centerline at the 'Distance from Motor tap off to cut position' set in the A|4<sup>th</sup> Axis preferences from the 'Motor End' tap off point used. If the Z axis was above the A-axis safe height, a second tap of the 'Move to Offset' will move the tool to the exact offset point in Z as well.

Likewise, once the front and rear are set (tapped off), tapping 'Move to Front' or 'Move to Rear' will move the tool to the respective tap off positions at the A-axis safe height.

Just as you do in 3 axis use, you will have to perform a 'Set' task with any tool change.

## Load and Run the GCode

Loading and running the job is the same whether you are in 4<sup>th</sup> axis mode or 3 axis mode. Once you've selected the file and it is loaded in the SCP2, hit 'Run'. On 'Run', the gantry will immediately move to the generated offset (the cut start location). After finishing the move, the SCP will load the gcode onto the SCB. Once that is loaded, you will be presented with a confirmation message. Press 'OK' if you are ready to run the tapfile.

In some configurations, you may need to start the router/spindle and let it get up to speed before clicking on 'OK' to start the job.

The Run controls – Run File, Continue, Pause, E-Stop – all perform in the same manner as when running a 3 axis job.

When the job is finished, the gantry will return to the offset position with the Z axis at the A-axis safe height.

You can also preview the resulting AAxis Virtual code from the View, View AAxis Code tool. A separate panel will pop up.

## 4<sup>th</sup> Axis Test Project

A VCarve Pro project file has been provided in the Samples folder of the SCP2 installation. This project is based on a 1 1/2 " diameter dowel rod that you can readily purchase at a neighboring hardware store. You'll want to cut a 9" length and setup the table top rotary to support this use. You'll need a 60° v-bit.

You'll also find 2 tap files in the Samples folder of the SCP2 installation. If you don't want to load the project into VCarve Pro, and generate your own toolpaths (or haven't yet copied the rotary post processors to your installation, use the one that is appropriate for how you setup the table top rotary.

- 4th Axis Test Project Orient Along X Axis.tap – use this tap file if you have setup the rotary along the X axis – or at an angle that is closer to the X axis than the Y axis.
- 4th Axis Test Project Orient Along Y Axis.tap – use this tap file if you have setup the rotary along the Y axis – or at an angle that is closer to the Y axis than the X axis.

This kind of simple project is also useful to determine if you need to check the A|4<sup>th</sup> Axis preferences Mirror Image. If the text is mirrored (backwards), check this preference, hit 'Ok' to save it, reload the tapfile and run the project again to confirm that the project is no longer being carved in a mirrored fashion.